

Role of Interstitial Pressure in Modulating Acute and Chronic Pain and in CSF Pressure Disorders

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2026 June 9

The recently-discovered component of human anatomy known as the interstitia is now a candidate for reclassification as its own organ for its increasingly apparent relevance to human health and to the functions of the human body.

The interstitia is crucial for the transport of chemical signals outside of the context of the circulatory system and proper interstitial function requires regular movement of the body, whereas these chemical signals are transmitted through a cycle of chemical pooling and agitation of the interstitia generated through physical movements as osmotic force is not sufficient, in isolation, to circulate these signals.

In addition to chemical signalling both supporting early development and for routine cellular function, the function of the interstitia and regular circulation of fluids in the interstitia may play a decisive role in our perception of pain.

Just as the body has a property of blood pressure and cerebrospinal fluid pressure, this author proposes that there is also an interstitial pressure and that this pressure is crucial to human health.

When it comes to the perception of pain; ranging from a toothache to that associated with fibromyalgia/neuralgia; it has long been observed that keeping active, being on one's feet and walking around eases the pain. This has long been attributed to the psychological distraction which exercise and work provide, but this is not a scientifically sound explanation. If anything, pain is the thing which distracts a person who is trying to work; work is not a distraction from pain.

The reason why keeping active seems to reduce pain is, I would posit, related to interstitial fluid pressure (if we measured this clinically as a matter of course, we might abbreviate this IF pressure or IFP and record this information along with BP.)

Pain sufferers report that pain worsens with inactivity, particularly while sitting or reclining. It makes sense that this would be the case as we already know that CSF pressure is elevated as a result of sitting, although this has not been adequately explained. The elevation of CSF pressure may well be secondary to the elevation of the interstitial pressure.

When a patient lies prone, a large portion of the surface area of their skin is compressed by the force of gravity acting against their body and the counterforce of the ground, a bed, the floor, et cetera acting against the body moving in the opposite direction. This could be predicted to increase interstitial pressure just as wearing constrictive clothing would.

With relation to pain, this increased pressure would increase surface tension in the area around nerves. Damaged nerves, regardless of the cause of the damage, secrete chemicals which retro-reflect “pain detection” electrical impulses emitted by the brain. The retroreflection of these probing signals is the cause of the perception of pain rather than the emission of a signal from the nerves as is currently believed by the medical community. The timing of the return signals is used by the brain to map the location of the pain according to distance from the brain.

That explained, these chemicals would be more likely to adhere to the exterior of the healthy parts of the nerve, along which electrical signals are conducted in addition to being conducted along the interior. Anything which lowers interstitial pressure would reduce the tendency of these chemicals to adhere to the exterior of nerves. Anything which increases the fluid pressure would make adhesion more likely. Readers are likely familiar with the expression, “rubbing salt in the wound.” The conventional wisdom holds that the coarse nature of salt is the reason why rubbing salt in a wound causes additional pain, but in reality, if a saline solution of sufficient concentration were applied to a wound, this would cause nearly pain just as readily as a coarse saltine emulsion.

The addition of sodium chloride to a localized area causes fluid accumulation and this accumulation causes IFP to increase locally, causing pain chemicals to adhere more regularly to the exteriors of nerves and the perception of pain to markedly increase.

A condition such as fibromyalgia (closely associated with diabetes mellitus) may not be entirely psychosomatic, as is currently believed, but may be the result of the systemic release of the chemicals associated with nerve damage caused by diabetic neuropathy and increased IFP caused by a lack of exercise and poor diet. This combination can sometimes result in phantom aches and pains or the feeling of “hurting all over.” This could be considered a type of ectopic pain in the sense that the chemicals causing the pain are being produced by nerves distant from the adhesion sites, the chemicals are migrating and, ultimately, attaching to nerves some distance away. This is not to be confused with “referred pain.”

This hypothesis is further supported by the observation that severe headache is the consequence of a patient standing up too soon after undergoing a spinal tap procedure. The spinal tap procedure involves the draining of a substantial quantity of the CSF, which reduces the CSF pressure temporarily. If the CSF pressure value is negative with relation to the intracranial pressure and a further negative pressure is generated by a patient standing up (as doing so causes IFP to decrease, which causes CSF pressure to decrease,) the CSF pressure becomes strongly negative and this causes intracranial fluid transfer through the meninges and into the peri-spinal space, which produces pain. This is related to the phenomenon of excessively *high* intracranial pressure causing headache, which can, ironically, be relieved by draining CSF. Too great a difference between the intracranial pressure and the CSF pressure produces pain in both cases.

This understanding, if confirmed, would change the way in which pain is managed and would provide an additional, useful metric for assessing overall health.